



RECEIVED
JAN 07 2004
TC 1700

DOCKET NO.: 51876P287

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

LEE MI DO, ET AL.

Application No.: 10/033,445

Filed: December 28, 2001

For: **ORGANIC
ELECTROLUMINESCENT DEVICE
AND PREPARATION THEREOF -
UTILITY**

Art Group: 1774

Examiner: Marie Rose Yamnitzky

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR PRIORITY

Sir:

Applicant respectfully requests a convention priority for the above-captioned application, namely:

<u>COUNTRY</u>	<u>APPLICATION NUMBER</u>	<u>DATE OF FILING</u>
Korea	2000-87121	30 December 2000

☒ A certified copy of the document is being submitted herewith.

Respectfully submitted,

Blakely, Sokoloff, Taylor & Zafman LLP

Eric S. Hymn, Reg. No. 30,139

Dated: December 24, 2003

12400 Wilshire Boulevard, 7th Floor
Los Angeles, CA 90025
Telephone: (310) 207-3800



VERIFICATION OF TRANSLATION

RECEIVED
JAN 07 2004
TC 1700

I, the below named translator, hereby declare;
that my name and my post office address are as stated below; and
that I am knowledgeable in the English and Korean languages and that I believe
the following is a true and complete translation into the English language of Korean
Patent Application No. 2000-87121 filed in the Korean Intellectual Property Office on
December 30, 2000 for Letters Patent, including a true translation of the Official
Certificate of the Application.

Signed this 20th day of December, 2003

Ji-Yeon Lee

Full name of translator

Signature of translator

HAECHON BLDG. 2F 741-40, YEOKSAM-1 DONG,
KANGNAMKU, SEOUL, 135-081

Post Office Address



RECEIVED
JAN 07 2004
TC 1700

【Abstract】

【Abstract】

5 In the organic electroluminescence(EL) device containing
a bis-condensed derivative of 4-(dicyanomethylene)-2-methyl-6-
(para-(dimethylamineostyryl)-4H-pyran, and the preparation
thereof, the inventive organic electroluminescence device has
a high luminescent efficiency and color coordinates based on a
high purity, and is further simple in a synthesis and is
10 prominent in a thermal stability, to thereby providing great
merits to a mass production of the organic electroluminescence
device.

【Selected Drawing】

Fig. 2A

【Index words】

15 organic electroluminescence device, 4-(dicyanomethylene)-2-
methyl-6-(para-(dimethylamineostyryl)-4H-pyran, red light
emitting material

【Specification】

【Title of the Invention】

ORGANIC ELECTROLUMINESCENT DEVICE AND PREPARATION THEREOF

5 【Brief Description of the Drawing(s)】

Fig. 1 represents a graph showing fluorescent spectrum of a red dopant in methylenechloride solution;

Fig. 2 presents a sectional view showing the structure of red OLEDs in an inventive embodiment 1;

10 Fig. 3 is a graph showing EL spectrum of red OLEDs manufactured by the inventive embodiment 1;

Fig. 4 illustrates a sectional view showing the structure of a red color organic EL device in an inventive embodiment 2;

15 Fig. 5 depicts a sectional view for the structure of red OLEDs in an inventive embodiment 3;

Fig. 6 is a sectional view for the structure of red OLEDs in an inventive embodiment 4;

20 Fig. 7 is a graph showing a change of organic EL spectrum according to a concentration change of 4-(dicyanomethylene)-2-methyl-6-julolidil-9-enil)-4H-pyran (DCJ) and 2,6-bis-(2-(5-(dibutylamineo)phenyl)vinyl)-4H-pyran-4-ylidene)propanedinitrile)(DADB) dopant in red OLEDs of an inventive embodiment 4;

25 Fig. 8 shows a sectional view for the structure of red OLEDs in an inventive embodiment 5;

Fig. 9 is a sectional view for the structure of red

OELDs in an inventive embodiment 6; and

Fig. 10 is a graph showing a characteristic of current-voltage-luminescence in red OELDs of an inventive embodiment 6.

5

***Description of the Principal Reference Numerals**

100: Organic electroluminescence device

110: Substrate 120: Anode (ITO electrode)

10 130: a first dielectric layer

150: organic layer 151: hole injection layer

152: hole transportation layer

153: emitting layer

154: electron transportation layer

15 155: electron injection layer

160: a second dielectric layer

190: cathode (metal electrode)

200, 300, 400, 500, 600: organic electroluminescent device

20 **【Detailed Description of the Invention】**

【Object of the Invention】

【Field of the Invention and the Related Prior Art】

25 The present invention relates to an organic electroluminescent (EL) device and a preparation thereof; and, more particularly, to an organic EL device and a preparation thereof, in which a new bis-condensed DCM (4-

(dicyanomethylene)-2-methyl-6-(para-(dimethylaminostyryl)-4H-pyran) derivative is used as an electroluminescence material.

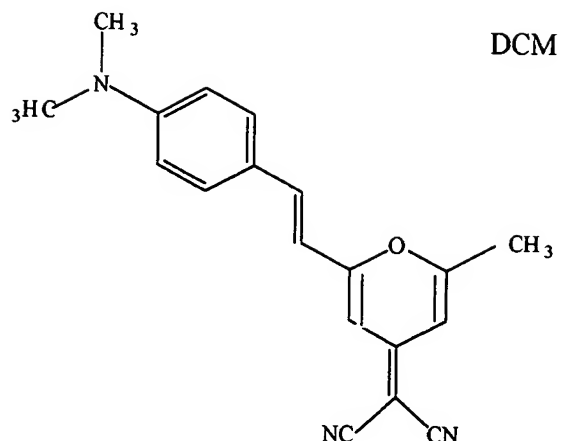
5 An organic emitting layer is gained by recombining electron and hole, and contains an emitting material representing electroluminescence, as a most simple structure, and also this emitting layer (EML) is provided as a single layer representing a high fluorescent quantum yield such as tris-(8-hydroxyquinoline) aluminum (hereinafter, referred to
10 as Alq₃).

Organic EL devices (OELDs) have been much researched for an application to a flat plate display which has a high efficiency, full color and a low voltage driving, since Tang's publication (Appl. Phys. Lett. 51, 913 (1987)). However, a red
15 (R), green (G) or blue (B) EML, which has a high luminescent efficiency and color coordinates based on a high purity and is stable in heat, is required to get full color EL display.

In a red emitting layer of a conventional technique to obtain red color, there is a method of doping, by a number of
20 wt% and below, derivative of DCM represented in the following chemical formula 1 as a guest, or a fluorescent material of red color such as porphyrin, on a host such as a Alq₃, or of using metal complex for EML (Appl. Phys. Lett. 69, 2959 (1996),
ibid, 65, 2124 (1994)).

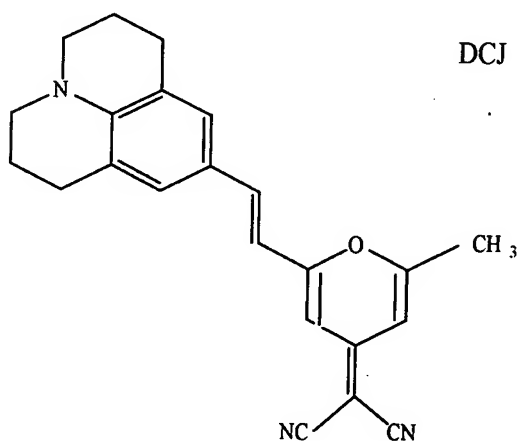
25

[Chemical Formula 1]



Y. Hamada et al. attempted to obtain pure red having a narrow width of spectrum by using Rubrene with emitting assist
 5 dopant (EA) which serves as an energy transfer role from the host to the dopant though itself does not emit light, in order to complement the shortcoming mentioned above in the device using a DCJ represented in the following chemical formula 2, but did not yet obtain high purity red color (red color
 10 coordinates on NTSC: 0.67, 0.33).

[Chemical Formula 2]

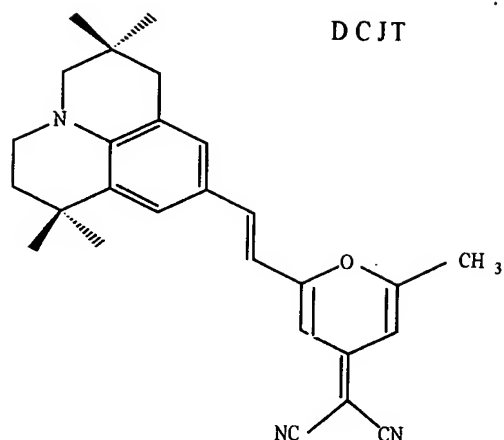


Among methods to gain red OLEDs, in a general phenomenon occurring when a red emitting material such as DCM is doped as a guest on a host such as Alq₃, there are shortcomings that emission spectrum is shifted to long wavelength in a range of 590nm-650nm according to a concentration increase of dopant, and that a luminous efficiency becomes lower.

V. Bulovic et al. had reported that a shift phenomenon of an emission wavelength is caused by polarization effects of a red fluorescent material such as DCJ (Chem. Phys. Lett., 287(1998)455), and that the emission wavelength becomes a red shift according that the polarization phenomenon is getting increased, namely, a dipole moment value is getting large.

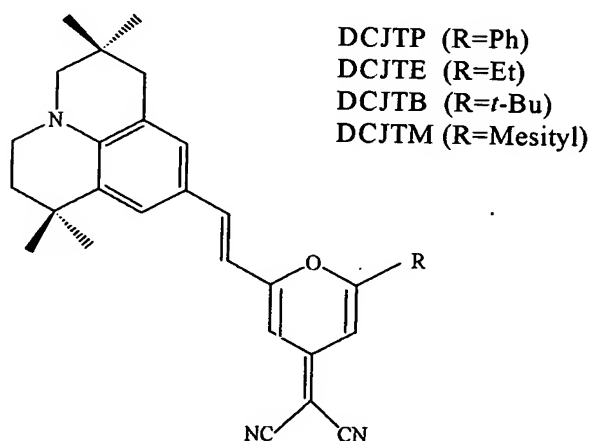
The red shift of the spectrum based on a concentration change of the DCM dopant and a reduction of the luminous efficiency are caused by an interaction between the dopant in a high concentration thereof, which is well-known as a concentration quenching. Therefore, in order to reduce such concentration quenching, a methyl group is induced into a julolidin ring, to then compose DCJT represented in the following chemical formula 3 (Proc. 2nd Internat. Sym. Chem. Functional Dyes, 1992, 536).

[Chemical Formula 3]



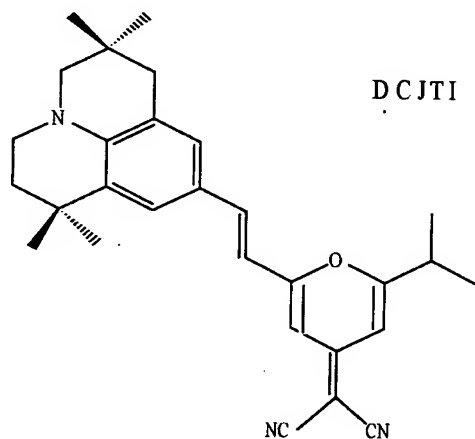
C. H. Chen et al. introduced substituents such as phenyl (DCJP), ethyl (DCJTE), *t*-butyl (DCJPB), and mesityl (DCJTM) groups as shown in the following chemical formula 4, instead of a methyl group of an activated pyran ring. Among them, the DCJTB most prominent in an aspect of luminescent efficiency reduced the phenomenon of the concentration quenching, but the emission spectrum gained 615nm (Macromol. Symp. 125, 49(1997), US patent number 5,908,581).

[Chemical Formula 4]



Further, C. H. Chen et al. introduced an isopropyl group instead of the t-butyl group, to compose DCJTI represented in the following chemical formula 5 through a simple synthesis process than DCTJB so as to obtain a red electroluminescence material at a lower price. The DCJTI obtained the emission spectrum of 615nm such as DCJTB, but did not yet obtain red color based on the high purity (Reference to Thin Solid Films 363, 327(2000)).

[Chemical Formula 5]



As above-described, in the red organic electroluminescence most well-known till now, there is the method of doping the DCM derivative on the Alq₃ host, but there is still a shortcoming that luminescence of Alq₃ itself as peak: 524 nm is reduced in the concentration increase of the dopant and luminescence of the red dopant is increased; to thus cause a shift to the long wavelength in the range of 600-650 nm.

【Objects of the Invention】

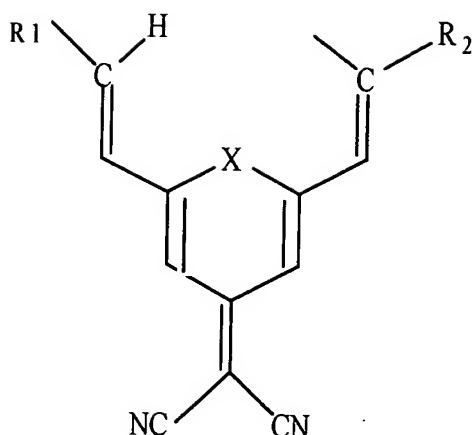
Therefore, it is an object of the present invention to provide organic electroluminescence devices and a preparation thereof, in which bis-condensed DCM derivative based on a new concept is used as a red electroluminescent material so as to
5 gain high purity red color (CIE: 0.67,0.33) luminescence of NTSC (National Television System Committee) with smaller concentration than red color dopant known up to now.

Another object of the present invention is to provide
10 OLEDs, which is thermally stable and simple in synthesis, and represents a red color based on high purity, and a preparation thereof.

【Description of the Invention】

15 To achieve these and other advantages, and in accordance with the purpose of the present invention, it is provided OLEDs composed of an organic emitting layer containing a compound which has a structure of the following
20 chemical formula 6.

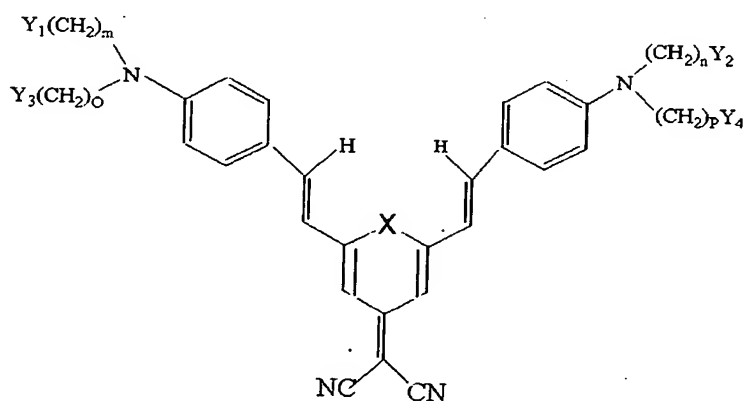
[Chemical Formula 6]



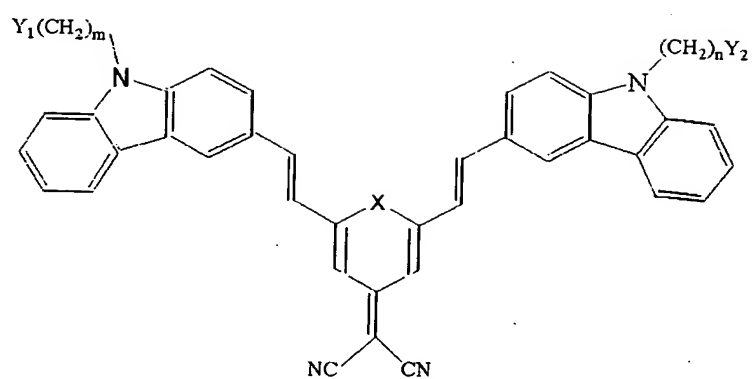
In the formula 6, X is O, S, CH₂ or NR, R is a lower alkyl group; and R₁ and R₂ are either fused ring structures having a ring-contained tertiary amine or 2-(dialkylamino) thienyl rings.

The compound having the structure of the chemical formula 1 contains compound represented in the following chemical formulas 7 through 10.

[Chemical Formula 7]

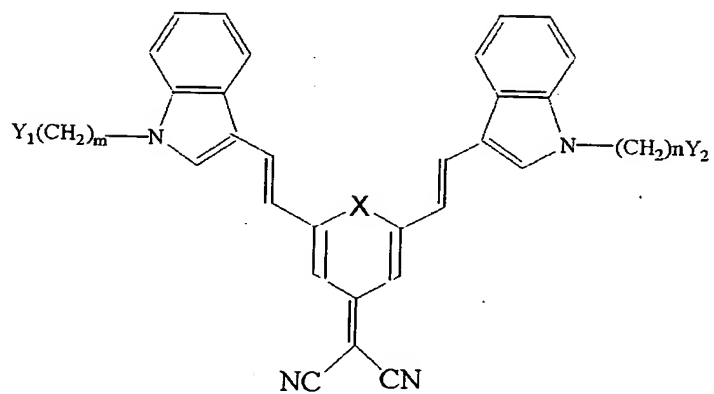


[Chemical Formula 8]

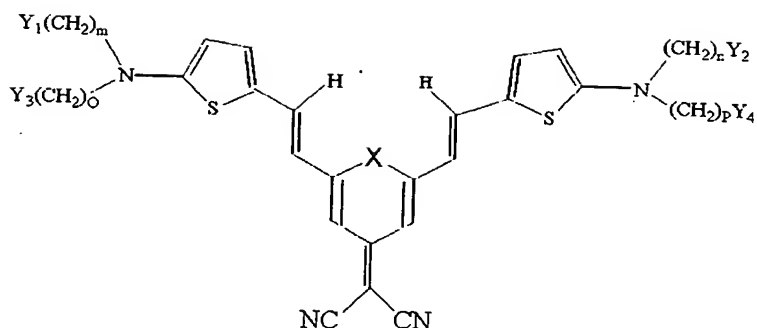


5

[Chemical Formula 9]



[Chemical Formula 10]



In the above chemical formulas 7 through 10, it has no problem that X is O, S, CH₂ or NR, R being a lower alkyl group; Y₁, Y₂, Y₃ and Y₄ respectively indicate H or OH; and m, n, o and p individually represent an integer between 1 and 20.

Or, in the chemical formulas 7 and 10, it has no problem that Y₁ and Y₃ are cyclic amine types in which the sum of -CH₂CH₂-, m+o is an integer from 0 to 2, and that Y₂ and Y₄ taken together are -CH₂CH₂ -, forming a cyclic amine wherein in sum of n+p is an integer from 0 to 2.

The OLEDs have a structure that an anode 120, an organic medium layer 150 and a cathode 190 are sequentially multilayered, and it can be also constructed by a structure that a dielectric layer 160 is formed between the anode and the cathode.

The inventive method of manufacturing the OLEDs includes the steps of: forming the anode 120 on a device substrate 110; forming the organic medium layer 150 containing a compound

having the structure of the chemical formula 6; and forming the cathode on top of the organic medium layer 150. Herewith, it is desirable that the compound of the chemical formula 6 is contained by a concentration of 20 weight % and below based on the host organic emitting layer. It is also desirable that the compound of the chemical formula 6 is uniformly mixed and doped in polymers matrix in the forming step of the organic medium layer.

In the invention, further, a self-emitting display containing the inventive OLEDs is provided.

Doping one or two or more dopants on the host material provides the afore-described red emitting material, and the EL device based on a high efficiency is constructed by using such method. Color of the EL device can be also obtained by using fluorescent materials having mutually different luminescent wavelength with a general host material. The structure of the dopant in which the Alq₃ is provided as the host, in the EL device, was described in detail by Tang (J. Appl. Phys., 75, 3610(1989); U. S. Pat. No. 4,769,292).

The most important relation to select the red fluorescent materials as the dopant is to energy transfer of a host corresponding to a band gap as an energy difference between HOMO and LUMO to the dopant. That is, a requisite condition in an occurrence of an efficient energy transition from the host to the dopant is that the band gap of the dopant must be smaller than the host material. Therefore, in a characteristic of the OLED in accordance with the present

invention, the larger polarization phenomenon becomes, it moves to the long wavelength and the band gap becomes small, and herewith, a phenomenon representing red fluorescence, which is referred to Chem. Phys. Lett., 287(1998)455, J. Am. Chem. Soc. 1996, 118, 12950, is used, in other words, a material for representing large dipole moments having hyper polarizability is used as red luminescent materials of the high purity.

That is, the red emitting material used in the invention is provided as a symmetrical type structure of a bis-condensed Y shape based on the DCM like the structure of the chemical formula 6, and is the structure of donor(D)-acceptor(A)-donor(D) having hyper polarizability, the structure having one acceptor part of (dicyanomethylene) pyran and two donor parts containing N. In this invention, therefore, red color luminescence based on the high purity, which is red color coordinates on the NTSC, 0.67, 0.33, can be obtained by using the fluorescent materials of the bis-condensed PAD structure.

The bis-condensed DCM derivatives used in the invention perform a bis-condensation without inertness of an active methyl group, in comparing it with DCJTb or DCJTI most well-known as red dopant till now, thereby being possible to reduce a synthesis process, it is also a merit in an aspect of a mass production and low price.

The inventive OLEDs include the following three constructive elements. Namely, they are first an anode substrate, secondly the red organic medium layer made by

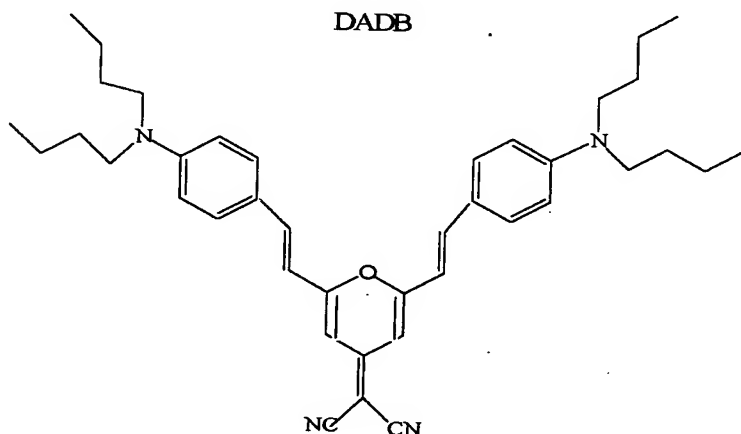
the red dopant material, and thirdly the cathode 190. The device may have the structure that a dielectric layer is inserted between the anode and the cathode and such dual dielectric layer prevents a flowing of charge, not only to
5 reduce leakage current but also to increase a recombination provability of the electron and the hole, therefore, a luminescence efficiency is increased.

The inventive bis-condensed red luminescent material may provide an emitting layer through a co-evaporation together
10 with the host material such as Alq₃, and may also provide a red EML by a spin-coating on a polymers host material such as PVK and then by drying a solvent to thus manufacture the red EML.

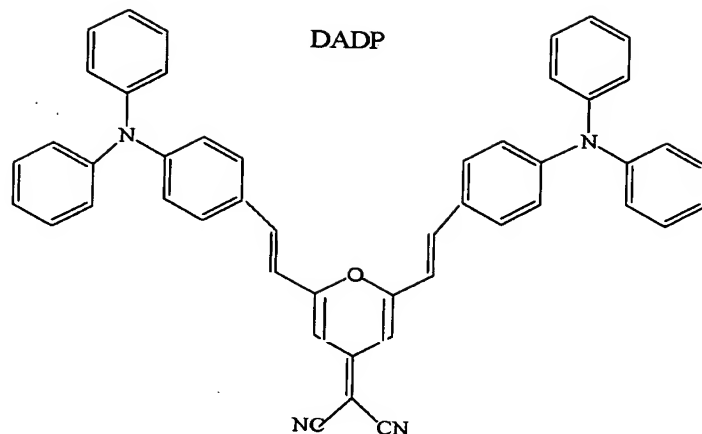
The red dopant used in the inventive embodiments is
15 represented in following chemical formulas 11 and 12.

[Chemical Formula 11]

DADB



[Chemical Formula 12]



5 Preferred Embodiment of the Invention

Hereinafter, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings.

10 Embodiment 1: Manufacture for red OLEDs of ITO(120)/
PVK-RED-PBD(150) /Al(190)

A manufacturing procedure of red OLEDs based on this inventive embodiment will be described with reference to Fig.

15 2.

Poly(N-vinylcarbazole)(PVK) of 70wt% and 2-(4-biphenyl)-5-(4-tertiary-butylphenyl)-1,3,4-oxadiazole(PBD) of 25wt% as the polymers host material are prepared in chloroform solvent, and DADB of 5wt% as a red dopant is manufactured by a concentration of 20mg/ml.

20

After that, red EML solution is spin coated on Indium Tin Oxide (ITO) electrode 120 under 1000rpm, 30sec, and then the solvent is eliminated under 100 degrees temperature, to thereby form a red EML 150. Al of 100nm or more is formed on such thin film through a thermal vacuum evaporating method or a sputtering method.

EL spectrum based on a concentration change of dopant (DADB) is represented in Fig. 3, in the device manufactured by the inventive embodiment 1.

Embodiment 2: Manufacture for red OLEDs of ITO(120) /PEDOT(151)/PVK-RED-PBD(153)) /Al(190)

A manufacturing procedure of red OLEDs in this inventive embodiment will be described with reference to Fig. 4.

Polyethylenedioxythiophene solution (hereinafter, referred to as PEDOT) is spin-coated on the cleansed ITO electrode 120 and then is thermal-processed under 100 degrees and one hour in the vacuum oven to eliminate the solvent and to thereby form a hole injection layer (HIL) 151. In order to make a red EML, as the polymers host material, PVK of 70wt%, PBD of 20wt% and the DADB of 5wt% as the red dopant are prepared by a concentration of 20mg/ml in the chloroform solvent. The solution is spin-coated by 1000 rpm, 30 sec, and the solvent is removed in the vacuum oven. Al is evaporated through the thermal vacuum evaporating method or the sputtering method so as to form a cathode 190 and manufacture

the red OLEDs.

Embodiment 3: Manufacture for red OLEDs of ITO(120)/
TPD(152) /Alq₃-RED(153) /Alq₃(154) /Al(190)

5

The red OLEDs in this embodiment is provided as a structure that the anode 120, the red organic medium layer 150 and the cathode 190 are sequentially prepared like the sectional view of Fig. 5. In a characteristic of this device,
10 the organic medium layer 150 has the structure of two layers or more, namely, the hole transporting layer (HTL) 152 and an EML 153 and the electron transporting layer (ETL) 154.

N, N-diphenyl-N, N-bis(3-methylphenyl)-1, 1-biphenyl-4,
4-diamine (hereinafter, referred to as TPD) as the HTL 152 is
15 evaporated on the ITO electrode 120. At this time, a thickness of the thin film is 50nm and an evaporation rate is 0.1 - 0.4 nm/s.

After that, in order to form the red organic EML 153 on a HTL 152, the co-evaporation is performed with Alq₃ of 95wt%
20 as the host material and the DADB based on a concentration of 5wt% as a dopant material. Then, an Alq₃ thin film based on 10nm thickness is formed as the electron transportation layer 154 on the EML 153, and after that, the Al thin film is evaporated through the thermal vacuum evaporating method or
25 the sputtering method so as to complete the red OLEDs.

Embodiment 4: Manufacture for red OLEDs of ITO(120)

/TPD(152) /Alq₃-RED(153) /Alq₃(154) /LiF(155) / Al(190)

The organic EL device based on the embodiment 4 has a structure that the anode 120, the organic medium layer 150 and the cathode 190 are sequentially prepared on a substrate 110, like the sectional view of Fig. 6. In a characteristic of this device, the organic emitting layer 150 has the structure of three layers or more, namely, the HTL 152 and the EML 153, and the electron transportation layer (ETL) 154 and the electron injection layer (EIL) 155.

In the same method as the embodiment 3, the HTL 152, the red emitting layer 153 and the ETL 154 thin films are formed on the ITO electrode 120. Then, LiF, an Al₂O₃, Li₂O₃ thin film as the EIL 155 is evaporated by about 1 nm, an evaporation rate is about 0.01 nm/sec.

It is shown in Fig. 7 a change of EL wavelength based on a dopant concentration change of DCJ and DADB when the organic EL device is made by the same structure as the embodiment 4 as mentioned above.

Embodiment 5: Manufacture for red OELDs of ITO(120) /CuPc(151)/TPD(152)/Alq₃-RED(153)/Alq₃(154)/ LiF(155) /Al(190)

The red OELDs in this embodiment is provided as a structure that the anode 120, the organic medium layer 150 and the cathode 190 are sequentially prepared like the sectional view of Fig. 8. In a characteristic of this device, the

organic medium layer 150 has the structure of four layers or more, namely, the HIL 151, the HTL 152, the emitting layer 153, the ETL 154 and the EIL 155.

5 A thin film based on a 15nm thickness of phthalocyanine-cooper (hereinafter, referred to as CuPc) as the HIL is firstly made on an ITO electrode 120. It can be also made by spin-coating a polymers thin film such as the PEDOT. In the same method as the embodiment 4, HTL, EML, ETL, EIL and cathode are made respectively.

10

Embodiment 6: Manufacture for red OLEDs of ITO(120)
/LiF(130) /PEDOT(151) /TPD(152) /Alq₃-RED(153) /Alq₃(155)
/LiF(160) /Al(190)

15 The red OLEDs in this embodiment is characterized by a structure that a dual dielectric layer is formed between anode 120, and the cathode 190 like the sectional view of Fig. 9. Thus, the OLEDs is provided by the structure that a first dielectric layer 130, the HIL 151, the HTL 152, the emitting
20 layer 153, the ETL 154, the EIL 155, a second dielectric layer 160 and the cathode 190 are formed on an anode 120.

A thin film based on about 1nm thickness of LiF as the first dielectric layer is firstly formed on the ITO electrode 120. The HIL is formed with the PEDOT through the same method
25 as the embodiment 2. In the same method as the embodiment 4, the emitting layer 153, the ETL 154 and the EIL 155 are formed respectively. After that, the second dielectric layer is

formed by the same method as the first dielectric layer, then, the cathode is formed so as to prepare the red OLEDs.

The dual dielectric layer formed between the anode 120 and the cathode 190 prevent charge flowing, to thereby reduce leakage current and also increase a probability of a recombination between the electron and the hole, that is, an increase of a luminescent efficiency.

Fig. 10 is a graph showing a characteristic of current-voltage-luminescence for the red OLEDs manufactured in the inventive embodiment 6.

It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without deviating from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

【Effect of the Invention】

20

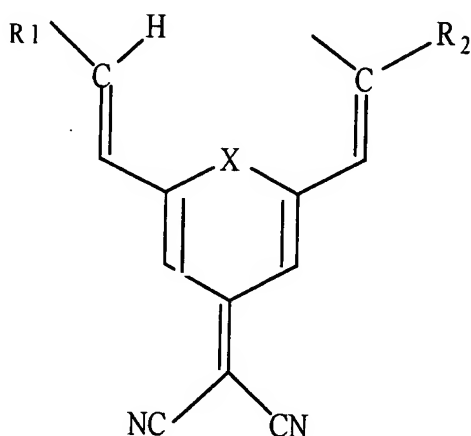
As afore-mentioned, in accordance with the present invention, the red fluorescent materials provides hyper polarizability as the bis-condensed DAD structure, to thus enable to obtain the red color luminescence based on the higher purity moved to the long wavelength, in comparison with DCJTB or DCJTI most well-known till now. In addition, this inventive red dopant is simple in synthesis and more prominent

in a thermal stability than the existing red emitting materials, therefore, the invention will great financial effect to a mass production of the red color OLEDs.

【Claims】

1. An organic electroluminescence device, comprising an anode and a cathode, and at least one organic luminescent medium layer containing a compound based on a structure of a chemical formula 6 as:

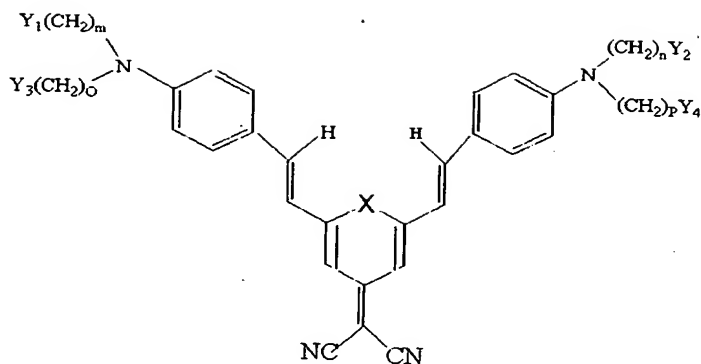
(Chemical Formula 6)



10 wherein X is O, S, CH₂ or NR, where R is a lower alkyl group; and R₁ and R₂ indicate a ring-containing tertiary amine or a fused ring having 2-(dialkylamino) thienyl ring.

15 2. The organic electroluminescence device as recited in claim 1, wherein said chemical formula 6 is a chemical formula 7 as:

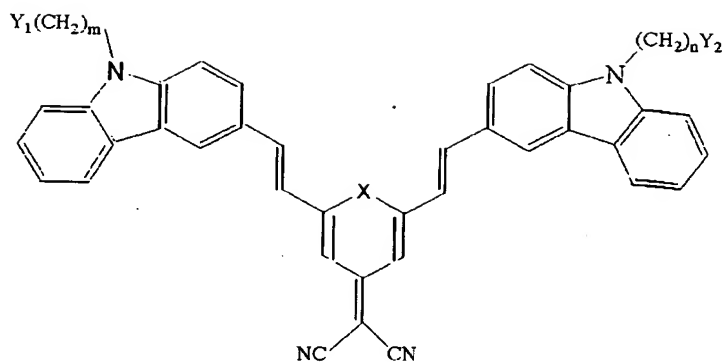
(Chemical Formula 7)



wherein X is O, S, CH₂ or NR, where R is a lower alkyl group; Y₁, Y₂, Y₃ and Y₄ may respectively indicate H, OH, or OL where L is a polymer linker subunit, and at least one of Y₁ and Y₂ is OL; and m, n, o and p may individually represent an integer between 1 and 20, or Y₁ and Y₃ may be ring type amine in which the sum of -CH₂CH₂-, m+o is an integer between 0 and 2; and Y₂ and Y₄ may be the ring type amine in which the sum of -CH₂CH₂ -, n+p is an integer between 0 and 2.

3. The organic electroluminescence device as recited in claim 1, wherein said chemical formula 6 is a chemical formula 8 which is as, e.g.,

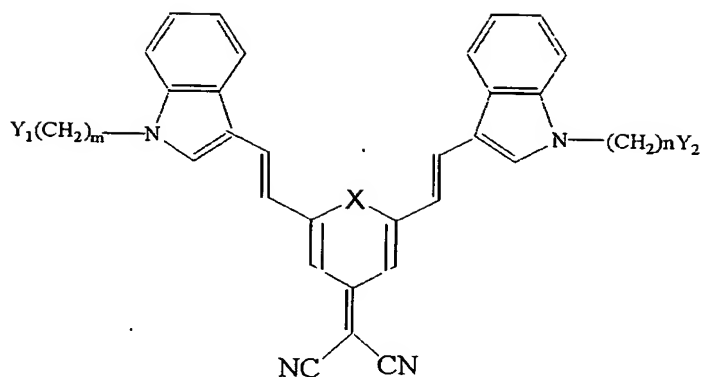
(Chemical Formula 8)



wherein X is O, S, CH₂ or NR, where R is a lower alkyl group; Y₁ and Y₂ may respectively indicate H, OH, or OL where L is a polymer linker subunit, and at least one of Y₁ and Y₂ is OL; and m, n, o and p may individually represent an integer between 1 and 20.

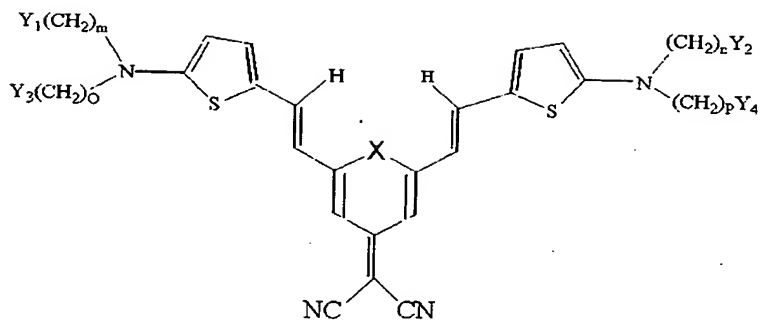
4. The organic electroluminescence device as recited in claim 1, wherein said chemical formula 6 is a chemical formula 9 as,

(Chemical Formula 9)



wherein X is O, S, CH₂ or NR, where R is a lower alkyl group; Y₁ and Y₂ may respectively indicate H, OH, or OL where L is a polymer linker subunit, and at least one of Y₁ and Y₂ is OL; and m, n, o and p may individually represent an integer between 1 and 20.

5. The organic electroluminescence device as recited in claim 1, wherein said chemical formula 6 is a chemical formula 10 as,
(Chemical Formula 10)



wherein X is O, S, CH₂ or NR, where R is a lower alkyl group; Y₁, Y₂, Y₃ and Y₄ may respectively indicate H, OH, or OL where L is a polymer linker subunit, and at least one of Y₁ and Y₂ is OL; and m, n, o and p may individually represent an integer between 1 and 20, or Y₁ and Y₃ may be ring type amine in which the sum of -CH₂CH₂-, m+o is an integer between 0 and 2; and Y₂ and Y₄ may be the ring type amine in which the sum of -CH₂CH₂ -, n+p is an integer between 0 and 2.

6. The organic electroluminescence device as recited in claim 1, wherein the anode (110), the organic luminescence layer (150) and the cathode (190) are laminated sequentially

7. The organic electroluminescence device as recited in claim 1 or claim 6, wherein the organic luminescence layer(150) is comprising a hole injection layer(151) and a red light emitting layer(153), wherein the layers are laminated

sequentially.

8. The organic electroluminescence device as recited in claim 1 or claim 6, wherein the organic luminescence layer
5 comprises a hole injection layer(151), a red light emitting layer(153) and a electron injection layer(155), wherein the layers are laminated sequentially.

9. The organic electroluminescence device as recited in
10 claim 1 or claim 6, wherein the organic luminescence layer comprises a hole injection layer(151), a red light emitting layer(153), a electron transportation layer(154) and a electron injection layer(155), wherein the layers are laminated sequentially.

15

10. The organic electroluminescence device as recited in claim 1 or claim 6, wherein the organic luminescence layer comprises a hole injection layer(151), a hole transportation layer(152), a red light emitting layer(153), a electron
20 transportation layer(154), and a electron injection layer(155), wherein the layers are laminated sequentially.

11. The organic electroluminescence device as recited in claim 10, wherein a dielectric layer is formed under part of
25 the hole transportation layer and another dielectric layer is formed on the electron injection layer.

12. The organic electroluminescence device as recited in claim 1 or claim 6, wherein a first dielectric layer is formed on the organic layer, and/or a second dielectric layer is formed on a under part of the hole transportation layer.

5

13. The organic electroluminescence device as recited in claim 1 or claim 6, wherein the anode is ITO and the cathode is Al.

10

14. The organic electroluminescence device as recited in claim 1 or claim 6, wherein the organic layer contains the compound of the chemical formula 6, by a concentration of less than or equal to 50% concentration.

15

15. Self emitting display comprising organic electroluminescence device according to the claim 1.

16. A method of manufacturing an organic electroluminescence device, comprising the step of:

20

forming a anode on a substrate;

making an organic emitting layer containing an emitting material of a chemical formula 6 in the claim 1, on the anode; and,

forming a cathode on the formed organic emitting layer.

25

17. The method as recited in claim 10, further comprising a step of forming a first dielectric layer after

the step of forming a anode, and a step of forming a second dielectric layer after the step of making an organic emitting layer.

5 18. The method as recited in claim 16, wherein the anode is ITO and the cathode is Al.

19. The method as recited in claim 16, the emitting material of a chemical formula 6 is the compound of the
10 chemical formula 7 in the claim 2.

20. The method as recited in claim 16, the emitting material of a chemical formula 6 is the compound of the chemical formula 8 in the claim 3.

15 21. The method as recited in claim 16, the emitting material of a chemical formula 6 is the compound of the chemical formula 9 in the claim 4.

20 22. The method as recited in claim 16, the emitting material of a chemical formula 6 is the compound of the chemical formula 10 in the claim 5.

23. The method as recited in claim 16, wherein the
25 organic layer contains the compound of the chemical formula 6, by a concentration of less than or equal to 50% concentration.

24. The method as recited in claim 16, wherein said step of making the organic layer includes the step of uniformly mixing the compound of the chemical formula 6 in polymers matrix and doping it.